DECLARATION

I, Kiyoshi HASEGAWA , of c/o ITOH-SHIN PATENT OFFICE, Musashi Bldg. 4-4, Nishishinjuku 7-chome, Shinjuku-ku, Tokyo, Japan, do solemnly and sincerely declare that I well understand English and Japanese languages and that the attached English translation is correct, true and faithful translation of the attached Japanese Priority Document to the best of my knowledge.

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Kiyoshi Hasegawa

Kiyoshi HASEGAWA

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[Title of the Invention] CHASSIS, DRUM, AND DRUM MOUNTING UNIT FOR MAGNETIC RECORDING REPRODUCING APPARATUS

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[Inventor]

[Address] c/o Toshiba Video Products Japan Co., Ltd. 1-1-1, Shibaura, Minato-ku, Tokyo

[Name] Akira MATSUI

[Inventor]

[Address] c/o Toshiba Video Products Japan Co., Ltd. 1-1-1, Shibaura, Minato-ku, Tokyo

[Name] Kimihiko NAKAMURA

[Applicant for Patent]

[Id. No.] 596082758

[Address] 1-1-1, Shibaura, Minato-ku, Tokyo

[Name] Toshiba Video Products Japan Co., Ltd.

[Agent]

[Id. No.] 100076233

[Patent Attorney]

[Name] Susumu ITO

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[Title of the Invention] CHASSIS, DRUM, AND DRUM MOUNTING UNIT FOR MAGNETIC RECORDING REPRODUCING APPARATUS

[Claims]

[Claim 1] A chassis of a magnetic recording reproducing apparatus, comprising:

a tilt stand having a drum mounting surface tilted with respect to a plane, and

one or more mounting holes formed on said mounting surface perpendicularly to said plane for mounting said drum.

[Claim 2] A chassis of a magnetic recording reproducing apparatus according to Claim 1, characterized in that one of said mounting holes is a shaft mounting hole into which a shaft of said drum is inserted,

in that said shaft mounting hole is a rectangular hole having one side of a size corresponding to a diameter of said drum in a direction perpendicular to a tilting direction of the mounting surface and the other side of a size set in the tilting direction of said mounting surface such that, when the shaft of said drum is inserted into the shaft mounting hole, the outer peripheral surface of the shaft is brought into contact with an obverse surface brim and a reverse surface brim of said drum mounting surface.

[Claim 3] A chassis of a magnetic recording reproducing apparatus according to one of Claims 1 or 2, wherein at

least one of said mounting holes is used for fixing said drum to said mounting surface with a predetermined fixing member and is a rectangular hole of a size corresponding to the size of said screw in a direction perpendicular to the tilting direction of said mounting surface.

[Claim 4] A chassis of a magnetic recording reproducing apparatus comprising:

a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, and

a shaft mounting hole which is formed on said mounting surface and into which a shaft of said drum is inserted to regulate the center position of said drum.

[Claim 5] A chassis of a magnetic recording reproducing apparatus, comprising:

a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon,

a shaft mounting hole which is formed on said mounting surface and into which a shaft of said drum is inserted, and

one or more mounting holes which are formed on said mounting surface in the range of a diameter smaller than the diameter of said drum from said shaft mounting hole to mount said drum thereon.

[Claim 6] A chassis of a magnetic recording reproducing apparatus, comprising:

a tilt stand formed on a main base and having a

mounting surface tilted to mount a drum thereon,

a shaft mounting hole which is formed on said mounting surface into which a shaft of said drum is inserted, and

an opening formed on said mounting surface at a corner opposite from said shaft mounting hole for exposing a connector mounted to said drum to the reverse surface of said main base.

[Claim 7] A chassis of a magnetic recording reproducing apparatus comprising:

a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, and

a cut and bent portion which is formed by cutting and bending said main base and retains said drum mounted on said tilt stand for provisionally fixing said drum.

[Claim 8] A drum of a magnetic recording and reproducing apparatus comprising:

a rotatable cylindrical fixing member for supporting a cylindrical rotary member provided with a head for tracing a tape on the peripheral surface thereof,

a shaft being a rotational center of said cylindrical rotary member, projecting from the bottom surface of said cylindrical fixing member, and being inserted into a first mounting hole formed on the mounting surface of a main base to position the drum with respect to the mounting surface, and

a fixing portion formed on the bottom surface of said cylindrical fixing member and fixed to said mounting surface by the use of a second mounting hole formed on said mounting surface to position the drum in the angular direction with respect to the mounting surface of the cylindrical fixing member.

[Claim 9] A drum mounting unit of a magnetic recording and reproducing apparatus comprising:

a tilt stand formed on a main base and having a mounting surface tilted with respect to a plane to mount a drum thereon,

a first and a second mounting holes which are formed on said mounting surface in a vertical direction with respect to said plane to mount said drum,

a shaft which is a rotational center of said drum and a part of which projects from the bottom surface of said drum and is inserted into said first mounting hole to position said drum with respect to said tilt of the drum, and

a fixing portion which is formed on the bottom surface of said drum and is fixed to said mounting surface by the use of said second mounting hole to position said drum in the angular direction with respect to said mounting surface.

[Detailed Description of the Invention]

[0001]

[Technical Field of the Invention]

The present invention relates to a chassis, drum, and drum mounting unit for magnetic recording reproducing apparatus in which the drum is mounted on a main base in a magnetic recording reproducing apparatus such as video tape recorder or the like.

[0002]

[Description of the Related Art]

In a VTR (video tape recorder) in the related art, a front loading system is sometimes employed in which a tape cassette is approximately horizontally inserted and loaded into a deck from the front of the deck. In the front loading system, when a cassette tape is inserted into a cassette holder from the front of the deck, the cassette holder moves to a tape loading unit and loads the tape cassette into the tape loading unit. When the tape cassette is set in a predetermined position, a tape in the tape cassette is pulled out by the tape loading unit.

[0003]

In a helical scan system, a tape pulled out from the tape cassette is reeled on a drum. That is, the tape loading unit is provided with a pair of tape pulling-out members (hereinafter, referred to as "slider"), which move from the position near the tape cassette through the position near one end of the drum to the position near the other end of the drum, and reels the tape on the drum by

hooking the tape on the slider and pulling out the tape, which enables recording and reproducing of the tape.

[0004]

The drum adapted to be mounted to the bottom surface of a chassis (hereinafter, referred to as "main base") in a tilted manner at a predetermined angle. Therefore, the main base is formed with a tilt stand, and the drum is fastened at the brim of the tilt stand with a screw so that the drum tilted at a predetermined angle is obtained.

[0005]

The drum needs to be mounted with extremely high accuracy of the order of several micrometers. In order to enable the drum to be mounted with extremely high accuracy, the tilt stand has to be formed by pressing in a press process which is different from a normal-feed press working for other portions of the main base. Therefore, there is a problem in that a number of processes are required. It is also considered that the tilt stand is formed separately by a die casting method. However, in this case, the number of processes further increases, and the number of parts also increases.

[0006]

Further, since the structure is such that the drum is fixed at several positions of the brim of the tilt stand, the drum mounting surface of the tilt stand is relatively

large in size, and the height of the tilt stand is also large. That is, the tilt stand needs to be subjected to a large bending by a press machine, which results in increased load of the press machine. In addition, the area of an opening made in the main base becomes large, which may cause a problem that the strength of the chassis decreases.

[0007]

A lead for guiding the tape is formed on the peripheral surface of the drum. There is a possibility that the lead is deformed when the drum is mounted on the brim of the tilt stand with screws. Therefore, in order to keep the linearity of the lead with sufficient accuracy, the surface of the tilt stand needs to be worked with extremely high accuracy, but it is very difficult to work.

[0008]

[Problems to be Solved by the Invention]

As described above, in the related art, in order to mount the drum with high accuracy, the tilt stand, on which the drum is mounted, needs to be formed by a press process different from the normal-feed press process. Therefore, there arises a problem that the number of process increases. Further, this presents problems that the load of the press machine increases and that the strength of the chassis decreases. Still further, in order to keep the linearity of the lead with sufficient accuracy, the accuracy of the

surface of the tilt stand needs to be improved, which presents a problem that it is difficult to work the same with high accuracy.

[0009]

In view of such circumstances, an object of the present invention is to provide a chassis, a drum, and a drum mounting unit of a magnetic recording reproducing apparatus which can reduce the load of the press machine, and increase the strength of the chassis without decreasing mounting accuracy of the drum and without reducing accuracy of the linearity of the lead by the tilt stand which is formed by one normal-feed press process.

[0010]

[Means for Solving the Problems]

A chassis of a magnetic recording reproducing apparatus according to Claim 1 of the present invention includes a tilt stand having a drum mounting surface tilted with respect to a plane and one or more mounting holes formed on the aforementioned mounting surface perpendicularly to the aforementioned plane for mounting the aforementioned drum.

A chassis of a magnetic recording reproducing apparatus according to Claim 4 of the present invention includes a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, and a shaft mounting hole which is formed on the aforementioned mounting surface

and into which a shaft of the aforementioned drum is inserted to regulate the center position of the aforementioned drum.

A chassis of a magnetic recording reproducing apparatus according to Claim 5 of the present invention includes a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, a shaft mounting hole which is formed on the aforementioned mounting surface and into which a shaft of the aforementioned drum is inserted, and one or more mounting holes which are formed on the aforementioned mounting surface in the range of a diameter smaller than the diameter of the aforementioned drum from the aforementioned shaft mounting hole to mount the aforementioned drum thereon.

A chassis of a magnetic recording reproducing apparatus according to Claim 6 of the present invention includes a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, a shaft mounting hole which is formed on the aforementioned mounting surface into which a shaft of the drum is inserted, and an opening formed on the aforementioned mounting surface at a corner opposite from the aforementioned shaft mounting hole for exposing a connector mounted to the aforementioned drum to the reverse surface of the aforementioned main base.

A chassis of a magnetic recording and reproducing

apparatus according to Claim 7 of the present invention includes a tilt stand formed on a main base and having a mounting surface tilted to mount a drum thereon, and a cut and bent portion which is formed by cutting and bending the aforementioned main base and retains the aforementioned drum mounted on the aforementioned tilt stand for provisionally fixing the aforementioned drum.

A drum of a magnetic recording and reproducing apparatus according to Claim 8 of the present invention includes a cylindrical fixing member for supporting a rotatable cylindrical rotary member provided with a head for tracing a tape on the peripheral surface thereof, a shaft being a rotational center of the aforementioned cylindrical rotary member, projecting from the bottom surface of the aforementioned cylindrical fixing member, and being inserted into a first mounting hole formed on the mounting surface of a main base to position the drum with respect to the mounting surface, and a fixing portion formed on the bottom surface of the aforementioned cylindrical fixing member and fixed to the aforementioned mounting surface by the use of a second mounting hole formed on the aforementioned mounting surface to position the drum in the angular direction with respect to the mounting surface of the cylindrical fixing member.

A drum mounting unit of a magnetic recording and

reproducing apparatus according to Claim 9 of the present invention includes a tilt stand formed on a main base and having a mounting surface tilted with respect to a plane to mount a drum thereon, a first and a second mounting holes which are formed on the aforementioned mounting surface in a vertical direction with respect to the aforementioned plane to mount the aforementioned drum, a shaft, which is a rotational center of the aforementioned drum and a part of which projects from the aforementioned bottom surface of the drum and is inserted into the aforementioned first mounting hole to position the aforementioned drum with respect to the aforementioned tilt of the drum, and a fixing portion which is formed on the bottom surface of the aforementioned drum and is fixed to the aforementioned mounting surface by the use of the aforementioned second mounting hole to position the aforementioned drum in the angular direction with respect to the aforementioned mounting surface.

[0011]

According to Claim 1 of the present invention, the chassis of a magnetic recording reproducing apparatus of the present invention includes one or more mounting holes formed on the tilt stand having the mounting surface tilted with respect to the plane perpendicularly to the plane.

[0012]

According to Claim 4 of the present invention, the main

base includes the tilt stand having the tilted mounting surface. The mounting surface is formed with the shaft mounting hole to insert the shaft of the drum. The center of the drum is regulated by inserting the shaft of the drum into the shaft mounting hole.

[0013]

According to Claim 5 of the present invention, the aforementioned mounting surface is formed with the shaft mounting hole into which the shaft of the drum is inserted. The mounting surface is formed with one or more mounting holes for mounting the drum in the range of a diameter smaller than the diameter of the drum from the shaft mounting hole. The position of the drum with respect to the mounting surface is regulated by inserting the shaft into the shaft mounting hole and an angle of the drum with respect to the mounting surface is regulated by the one or more mounting holes. The one or more mounting holes are formed in the range of a diameter smaller than the diameter of the drum and displacement of the inclined angle of the drum, which is mounted via the mounting holes, is small.

[0014]

According to Claim 6 of the present invention, the connector is exposed through the opening positioned on the mounting surface at the corner opposite from the shaft mounting hole to the reverse surface of the main base.

Accordingly, the free region can be effectively used.

[0015]

According to Claim 7 of the present invention, the cut and bent portion enables provisional fixation for mounting the drum on the mounting surface. The cut and bent portion is formed by cutting and bending the main base, and is very simple in construction.

[0016]

According to Claim 8 of the present invention, the cylindrical rotary member is rotatable about the shaft, and includes the portion projecting from the bottom surface of the cylindrical fixing member. By inserting the projecting portion into the first mounting hole formed on the tilted mounting surface of the main base, positioning with respect to the mounting surface is enabled. The second mounting hole is formed on the bottom surface of the cylindrical member. By fixing to the mounting surface by the use of the second mounting hole, angular positioning is enabled.

[0017]

According to Claim 9 of the present invention, the first and the second mounting holes are formed projectingly from the mounting surface perpendicularly with respect to the plane. The shaft includes the portion projecting from the bottom surface of the drum, which is inserted into the first mounting hole to position the drum with respect to the

mounting surface. In addition, by fixing it to the mounting surface by the use of the second mounting hole formed on the bottom surface of the drum, the mounting angle of the drum is determined.

[0018]

[Description of the Embodiments]

Embodiments of the present invention will be hereinafter described in detail with reference to the drawings. Fig. 1 is a plan view, when viewed from the top, of a magnetic recording reproducing apparatus in which a chassis, a drum, and a drum mounting unit of a magnetic recording reproducing apparatus in accordance with one embodiment of the present invention. Fig. 2 is an illustration showing a state in which a cassette holder is removed from Fig. 1, in which Fig. 2(a) is a view when viewed from the top, and Fig. 2(b) is a drawing when viewed in the direction indicated by an arrow A in Fig. 2(a). Fig. 3 is an illustration showing Fig. 1 when viewed from the different direction, in which Fig. 3(a) is a view when viewed from the back and Fig. 3(b) is a view when viewed in the direction indicated by an arrow B in Fig. 3(a). Fig. 4 is a perspective view to specifically show the drum in Fig. 1 when viewed from the main base side. Fig. 5 is a perspective view showing the vicinity of the drum mounting portion of a main base 12 in Fig. 1. Fig. 6 is a

perspective view, when viewed from the direction of C in Fig. 1, to show the drum mounting portion where the drum is mounted. Fig. 7 is an illustration showing how to make a mounting hole in Fig. 5.

[0019]

In the present embodiment, a drum mounting portion can be formed by one normal-feed press working without decreasing the mounting accuracy of the drum by optimally mounting the drum on the chassis.

[0020]

In Fig. 1 to Fig. 3, a chassis 11 has the main base 12 and both sides (guide plates) 13, 14 thereof. A drum 22 is mounted on the main base 12. The drum 22 is rotatably mounted to the chassis 11 at a predetermined angle.

[0021]

In a tape cassette (not shown), there are provided a supply hub and a take-up hub (both not shown) and a tape is reeled around the hubs and is stored. On the main base 12, a supply reel disk 23 and a take-up reel disk 24 are rotatably mounted on the shafts implanted in the main base 12. When the cassette is loaded, the supply hub and the take-up hub of the tape cassette are retained by the supply reel disk 23 and the take-up reel disk 24 respectively. The rotation of a capstan motor 28 is transmitted to the supply reel disk 23 and the take-up reel disk 24 via a gear box 25

so as to be rotatable according to a motion mode.

[0022]

When the cassette loading is finished, the tape cassette is arranged at a position where the surface of the tape cassette from which the tape is taken out faces the peripheral surface of the drum 22 by a cassette loading mechanism described below.

[0023]

On the other hand, a pair of guide grooves 1, 2 for guiding sliders 3, 4, which are tape pulling-out members, are formed in the main base 12 from the vicinity of the position of a cassette holder 90 when the cassette loading is finished to the vicinity of the rear end of the drum 22 by way of the vicinity of the front end of the drum 22. The sliders 3, 4 are guided by the guide grooves 1, 2 and are freely slid between the base end side positions of the guide grooves 1, 2 in the vicinity of the front end of the cassette holder 90 and the end side positions of the guide grooves 1, 2 in the vicinity of the rear end of the drum 22.

[0024]

The sliders 3, 4 are constructed by mounting rotatable guide rollers 26, 27 on the shafts having flanges, respectively. When the tape cassette is inserted into the deck and the cassette loading is finished, the sliders 3, 4 are positioned in the vicinity of the front end of the

cassette holder 90. Then, when the guard panel on the front side of the tape cassette is opened, the peripheral surfaces of the guide rollers 26, 27 of the sliders 3, 4 are positioned at the reverse surface side (opposite from the magnetic recording surface) of the tape in a cassette half.

[0025]

When the cassette loading is finished, the supply hub and the take-up hub become freely rotatable and hence are capable of pulling out the tape from the tape cassette. In other words, when the sliders 3, 4 move along the guide grooves 1, 2 to the rear end side of the drum 22 in a state in which the tape is in contact with the peripheral surfaces of the guide rollers 26, 27 on the rear end side, the tape is pulled out from the tape cassette, and travels by being guided by the guide rollers 26, 27. When the tape is traveling, the tape is prevented from coming out of contact with the guide roller by flanges provided on both ends of the guide rollers 26, 27.

[0026]

Further describing in detail, on the running path of the tape are provided with the drum 22, various kinds of poles for regulating the running path, and various kinds of heads for performing the magnetic recording and reproducing. The guide roller 27, a supply side tape guide pole 31, a tension pole 32, a take-up side tape guide pole 33, the

guide roller 26, a capstan roller 34, and a guide pole 35 are disposed in the vicinity of the guide panel in a state in which the cassette loading is finished, so that the reverse surface of the tape wound across the supply hub and the take-up hub in the tape cassette faces the rear ends of the peripheral surfaces thereof when the cassette loading is finished. The guide roller 27 and the guide pole 31 move simultaneously with the slider 4, and the guide roller 26 and the guide pole 33 move simultaneously with the slider 3.

[0027]

On the side of the guide groove 2, there are arranged a width-wide erasing head 40 and a guide pole 36, and on the side of the guide groove 1, there are arranged an ACE head 41 for forming a voice track and a control track and a guide pole 37. In addition, a pinch roller 38 is also provided so as to face the capstan roller 34.

[0028]

In the state where the cassette loading is finished, the tape is pulled out of the supply hub by the movement of the sliders 3, 4 along the guide grooves 1, 2 toward the rear end of the drum 22 and is reeled around the peripheral surface of the drum 22 by way of the guide pole 36, the width-wide erasing head 40, the guide roller 27, and the supply side tape guide pole 31, and further is reeled by the take-up hub via the take-up side tape guide pole 33, the

guide roller 26, the head 41, the guide pole 37, between the capstan roller 34 and the pinch roller 38, and the guide pole 35.

[0029]

While the slider 4 is moving, the tension pole 32 moves toward the guide pole 36, and comes into contact with the reverse surface of the tape to adjust the tension of the tape. Further, when the tape loading is finished, the pinch roller 38 moves toward the capstan 34 side to press the tape onto the peripheral surface of the capstan 34.

[0030]

The pinch roller 38 is freely rotated and is rotated by the capstan roller 34 with interposition of the tape when the capstan roller 34 is rotated according to the rotation of the capstan motor 28, whereby the tape can be carried. As shown in Fig. 3, the rotation of the capstan motor 28 is transmitted also to a pulley clutch 46 via a belt 45. The pulley clutch 46 transmits the rotational force of the capstan motor 28 through the gear box 25 to the supply reel disk 23 or the take-up reel disk 24. Accordingly, the tape can be traveled according to the operation mode.

[0031]

The tape is loaded by using the rotational force generated by a loading motor 51 arranged on the side 14 of the chassis 11. The rotational force generated by the

loading motor 51 is transmitted to a worm gear 80. A rotatable worm wheel 52 is mounted on the side of the chassis 11 and a joint gear 53 engaging with the worm wheel 52 is rotatably mounted on the reverse surface of the main base 12. Further, on the reverse surface of the main base 12, there is rotatably mounted a cam switch driving gear 54 engaging with the joint gear 53. The rotational force of the loading motor 51 is transmitted from the worm 80 to the cam switch driving gear 54 via the worm wheel 52, and the joint gear 53.

[0032]

A slider cam 57 is slidably mounted on hooks 55, 56 fixed to the reverse surface of the main base 12. The slider cam 57 is a plate-shaped member having a shape according to the mode, and the teeth linearly formed on one end side is engaged with the cam switch driving gear 54. The slider cam 57 is driven so as to move to a horizontal position according to the rotation of the cam switch driving gear 54.

[0033]

A loading driving gear 58 is mounted between the base end sides of the guide grooves 1 and 2 so as to be rotatable about the vicinity of a shaft 59 implanted in the main base 12. The loading driving gear 58 is engaged with teeth formed linearly on the other end side of the slider cam 57,

so as to rotate according to the linear movement of the slider cam 57. A first and a second arms 60, 61 are arranged between the guide grooves 1 and 2 opposite to the engaging portion of the loading driving gear 58 with the slider cam 57.

[0034]

The first and the second arms 60, 61 are rotatably mounted via the shafts 66, 67 implanted in the main base 12. The first arm 60 has a gear portion 63 shaped like a disk, part of which is toothed, and an arm portion 62 integrally formed with the gear portion 63. The second arm 61 has a gear portion 65 shaped like a disk, part of which is toothed, and an arm portion 64 integrally formed with the gear portion 65. The gear portions 63, 65 are constituted such that they are engaged with each other and are rotated in the opposite directions with respect to each other.

[0035]

An integrally formed cutaway gear 68 is mounted concentrically with the gear portion 63 on the surface of the gear portion 63. The cutaway gear 68 is engaged with the teeth 69 formed on a part of the outer periphery of the loading driving gear 58. When the loading driving gear 58 rotates, the gear portion 63 is rotated and further the gear portion 65 is also rotated.

[0036]

One ends of each of the connecting members 72, 73 are pivotally supported, by means of shaft, by the tip ends of the arm portions 62, 64. The other ends of the connecting members 72, 73 are supported, by means of shafts, by the retaining portions 7, 8 formed on the rear ends of the respective sliders 3, 4. The arm portions 62, 64 of the first and the second arms 60, 61 are constituted such that tip end sides thereof are located in the vicinity of the base end sides of the guide grooves 1, 2, and the sliders 3, 4 are stopped on the base end sides of the guide grooves 1, 2 when the loading driving gear 58 is at the end position of rotation at the beginning of the tape loading.

[0037]

A stopping member 75 projecting to the obverse surface side of the main base 12 is integrally formed with the slider 4 and the stopping member 75 is in contact with a tension arm 76 in the state where the sliders 3, 4 are positioned on the proximal sides of the guide grooves 1, 2. An unloading stopper 79 is projected from the surface of the main base 12, and prevents the tension arm 76 from moving in the unloading direction of the slider 4 by the unloading stopper 79. That is, since the slider 4 stops in the state where the stopping member 75 is in contact with the tension arm 76 and the unloading stopper 79, the positions of the guide roller and the tape guide are regulated when the tape

cassette is unloaded.

[0038]

The loading motor 51 drives not only a tape loading mechanism but also a cassette loading mechanism. In other words, on the side 14 of the chassis 11, there are provided a rotatably mounted front loading cam gear (hereinafter, referred to as "FL cam gear") 81 engaged with the worm wheel 52. The rotational force of the loading motor 51 is transmitted to the FL cam gear 81 via the worm gear 80 and the worm wheel 52.

[0039]

A front loading driving slider (hereinafter, referred to as "FL driving slider") 82 is slidably mounted on a hook 83 fixed to the side 14 of the chassis 11 and on a locking portion 84 at the extremity of the revolving shaft of the FL cam gear 81.

[0040]

The FL driving slider 82 is a plate-shaped member having a shape according to the mode and a guide pole 85 is implanted therein toward the surface side of the FL cam gear 81. On the surface of the FL cam gear 81 is formed a guide groove 86, and since the guide pole 85 implanted in the FL cam gear 81 is fitted in and slide in the guide groove 86, the FL driving slider 82 is slid in accordance with the rotation of the FL cam gear 81. On the brim of the FL

driving slider 82 is formed a cutaway 87 to be retained by a retaining portion 92 of an arm assembly 120.

[0041]

The arm assembly 120 freely swings around a shaft 128 fixed to the side 14 of the chassis 11, and when the FL driving slider 82 is slid to move the retaining portion 92 back and forth in the direction of the chassis 11, the arm assembly 120 is swung around the shaft 128. A guide post 107 of a cassette holder 90 is inserted into a retaining groove 127 of the arm assembly 120 and the cassette holder 90 is driven in the horizontal direction and in the vertical direction by the swing of the arm assembly 120.

[0042]

The cassette holder 90 is composed of a bottom plate 95 and left and right brackets 96, 97 which are connected to the bottom plate 95. A pair of guide posts 105, 106 are implanted at a front and a back positions in the left bracket 96 and the guide post 107 is implanted in the right bracket 97.

[0043]

A pair of guide grooves 112, 111 into which the guide posts 105, 106 are slidably inserted, respectively, are formed in the side 13 of the chassis 11 so as to carry the cassette holder 90 in the horizontal direction and in the vertical direction. In the side 14 of the chassis 11 as

well, is formed one guide groove 113 into which the guide post 107 is slidably inserted.

[0044]

The guide grooves 111 to 113 are formed through both sides 13, 14 of the chassis 11, and are extended in the horizontal direction in the upper side of the sides 13, 14 and downward in the vertical direction in the rear end side of the chassis 11. When the guide posts 105, 106 are inserted into guide grooves 112, 111, respectively, and the guide post 107 is inserted into the guide groove 113, the guide posts 106, 105, 107 are moved along the guide grooves 111 to 113 to move the cassette holder 90 in the horizontal direction from the cassette entry side and further downward in the vertical direction at the rear end side of the chassis 11 to position the bottom plate 95 of the cassette holder 90 near the main base 12.

[0045]

In order to carry the cassette holder 90 in the horizontal direction and further downward in the vertical direction to press it onto the chassis 11, the arm assembly 120 is employed. The arm assembly 120 is composed of a plate 121, a left bracket 122, and a right bracket 123. The plate 121 is a flat plate and is constituted such that when its both ends are inserted into fitting portions 124, 125 of the brackets 122, 123, the left and the right brackets 122,

123 are connected.

[0046]

The left bracket 122 is formed with a retaining groove 126 into which the guide post 105 of the left bracket 96 of the cassette holder 90 is inserted. The retaining groove 126 is formed in an elongated shape corresponding to the horizontal and vertical movements of the guide post 105. That is, the guide post 105 of the cassette holder 90 is inserted into the retaining groove 126 of the arm assembly 120 and the guide groove 112 formed on the side 13 of the chassis 11 at the same time.

[0047]

On the other hand, the right bracket 123 is formed with a retaining groove 127 into which the guide post 107 of the right bracket 97 of the cassette holder 90 is inserted. The retaining groove 127 is formed in an elongated shape corresponding to the horizontal and vertical movements of the guide post 107 and has an opening into which the guide post 107 is inserted in the upper portion. That is, the guide post 107 of the cassette holder 90 is inserted into the retaining groove 127 of the arm assembly 120 and the guide groove 113 formed on the side 14 of the chassis 11 at the same time. As described above, since the retaining portion 92 is moved back and forth in the direction of the chassis 11 by the FL driving slider 82, the arm assembly 120

swings around a shaft 128 fixed to the side 14 of the chassis 11.

[0048]

In a state in which the longitudinal side of the bracket 123 is approximately parallel to the main base 12, the guide post 107 in the retaining groove 127 is pressed onto the main base 12 side by a predetermined urging member, whereby the tape cassette is pressed onto the main base 12 side when the cassette loading is finished.

[0049]

In Fig. 4 to Fig. 6, the drum 22 is rotatable about a shaft 131. The peripheral surface of the drum 22 is formed with a lead 132 for guiding the travel of the tape. A head, not shown, is arranged around the peripheral surface of the drum 22 and is rotated with the rotation of the drum 22 so as to trace the tape running around the peripheral surface of the drum 22 to perform magnetic recording and reproducing.

[0050]

At the center of the bottom surface of the drum 22, there is formed a mounting portion 133 where the drum 22 is mounted on the main base 12. The mounting portion 133 has a plane vertical to the axial direction of the shaft 131 with the shaft 131 as a center. The shaft1 31 has a portion projected from the mounting portion 133 on the bottom surface of the drum 22.

[0051]

The shaft 131 projects from the center of the mounting portion 133, and the mounting portion 133 in the vicinity of the projecting portion is formed with screw holes 134 for mounting the drum 22 to the main base 12 at three positions thereof. The mounting portion 133 is also formed with a provisional screw hole 135 for provisionally mounting the drum 22. The drum 22 is positioned in the angular direction by the three screw holes 134.

[0052]

In the present embodiment, as will be described below, the drum 22 is mounted with reference to the center, that is, the drum 22 is positioned in the horizontal plane with the projecting portion of the shaft 131 of the mounting portion 133 at the center and is positioned in the angular direction by the use of the screw holes 134. Since the screw holes 134 are formed near the shaft of the mounting portion 133, that is, at positions relatively short distance away from the projecting portion of the shaft 131, that is, the rotational center of the drum 22, when the drum 22 is mounted by the use of the screw holes 134, even when the surface accuracy of a mounting surface 144 of the main base 12 is relatively low, the linearity of the lead 132 can be sufficiently ensured.

[0053]

The drum 22 is formed with a connector 136 for electrically connecting between an electrical circuit in the drum 22 and an electrical circuit on the main base 12 around the bottom surface.

[0054]

The main base 12 is formed with a drum mounting portion 141 between the guiding grooves 1 and 2. In the present embodiment, the drum mounting portion 141 is formed by one normal-feed press working and has an opening 143 for arranging the connector 136 fixed to the drum 22 and a tilt stand 142.

[0055]

The tilt stand 142 has, on the obverse surface thereof, the mounting surface 144 tilted at a predetermined angle with respect to the reference surface of the main base 12. The tilting direction of the mounting surface 144 is the left and right direction of the chassis 11. The tilt stand 142 has a portion lower than the reference surface on the guide groove 2 side and a portion higher than the reference surface of the main base 12 on the guide groove 1 side. The size of the mounting surface 144 corresponds to the size of the mounting portion 133 of the drum 22 and sufficiently smaller than the size of the bottom surface of the drum 22. Therefore, the height of the tilt stand 142 is comparatively small to reduce the load of bending in the press machine.

[0056]

Since the size of the tilt stand 142 is small, the opening 143 in which the connector 136 is disposed can be formed in the direction facing the mounting surface 144 of the tilt stand 142, that is, between the guide groove 2 in the left and right direction of the chassis 11 (hereinafter, referred to as "X-axis direction"), which extremely increases flexibility of design.

[0057]

The mounting surface 144 of the tilt stand 142 is formed with a shaft mounting hole 145 into which the shaft 131 of the drum 22 is inserted, and three mounting holes 146 through which screws are screwed into the screw holes 134 of the drum 22. These mounting holes 145, 146 are formed at the positions corresponding to the shaft 131 and the screw hole 134 of the drum 22.

[0058]

In the present embodiment, the tilt stand 142 is formed by one normal-feed press working and these mounting holes 145, 146 are also made by punching the main base 12 in the vertical direction, as is the case with the other portions of the main base 12. That is, the mounting hole 146 is a rectangular hole having one side whose length is equal to the diameter of the screw screwed thereinto in the direction perpendicular (in the back and forth direction of the main

base 12) (hereinafter, referred to as "Y-axis direction") to the tilting direction (X-axis direction) of the mounting surface 144 and the other side having a predetermined length in the X-axis direction. The shaft mounting hole 145 is a square elongated hole having a length being agree with the diameter of the shaft 131 in the Y-axis direction, and a length corresponding to the diameter of the shaft 131 in the X-axis direction.

[0059]

Fig. 7 is an illustration to show the punching of the shaft mounting hole 145, that is, a cross sectional view of the mounting surface 144 at the position of the shaft mounting hole 145.

[0060]

The mounting surface 144 is formed at a predetermined angle with respect to the reference plane of the main base 12. A rectangular hole 45 larger than the diameter of the shaft 131 of the drum 22 in the direction of X-axis is punched out at the predetermined position in the mounting surface 144 in the vertical direction with respect to the reference plane of the main base 12. A length d1 designates the length of a side in the direction of X-axis of the rectangular hole formed by punching and a length d2 designates the diameter of the shaft 131.

[0061]

The shaft 131 is mounted on the mounting surface 144 with its axis perpendicular to the mounting surface 144. The length d1 of the side in the direction of X-axis of the shaft mounting hole 145 is determined based points P1, P2 on the obverse surface and the reverse surface of the mounting surface 144 where the shaft 131 is put into contact with the internal surface of the mounting hole 145. Accordingly, the shaft 131 is positioned in the direction of X-axis by these points P1, P2 of the mounting hole 145. Further, the length of a side in the direction of Y-axis of the shaft mounting hole 145 is made to agree with the diameter d2 of the shaft 131, whereby the shaft 131 is positioned also in the direction of Y-axis by the shaft mounting hole 145.

[0062]

In this manner, the elongated hole (rectangular hole) are punched in the mounting surface 144 in the vertical direction with respect to the reference plane to form the respective mounting holes 145, 146, and thus the mounting surface 144 and the respective mounting holes 145, 146 can be made by one stroke of the press machine.

[0063]

A cut and bent portion 147 is formed at the position corresponding to the provisional mounting hole 135 of the drum 22 at the bottom end of the mounting surface 144. The cut and bent portion 147 is formed by cutting and bending

the bottom end of the mounting surface 144. The opening 143 is formed at the position corresponding to the connector 136 of the drum 22 to expose the connector 136 to the reverse surface side of the main base 12 when the drum 22 is mounted on the mounting surface 144.

[0064]

Subsequently, the operation of the embodiment constituted in this manner will be described with reference to Fig. 8 and Fig. 9. Fig. 8 and Fig. 9 illustrate the mounting of the shaft 131 or a screw 150 in the respective mounting holes 145, 146.

[0065]

The main base 12 is formed by one normal-feed press working. For example, the tilt stand 142 is formed by bending and the mounting holes 145, 146 and the opening 143 are formed by vertical punching. The tilt stand 142 is formed by one press process, and hence the number of processes can be decreased. The mounting surface 144 of the tilt stand 142 is small in size in correspondence to the size of the mounting portion 133 of the drum 22 and hence the tilt stand 142 is small also in height, which results in reducing the load of bending in the press machine.

[0066]

Further, the opening 143 for arranging the connector 136 can be formed in the left and right direction (in the X-

axis direction) of the chassis 11 with respect to the tilt stand 142, which results in extremely increasing the flexibility of design.

[0067]

The drum 22 is mounted on the pressed tilt stand 142 of the main base 12 shown in Fig. 5. First, the shaft 131 of the drum 22 is inserted into the shaft mounting hole 145 formed on the mounting surface 144 of the tilt stand 142. Fig. 8 shows the direction into which the shaft 131 is inserted. Since the length of the side in the direction of Y-axis of the shaft mounting hole 145 is set at the diameter of the shaft 131, when the shaft 131 is inserted into the mounting hole 145, the shaft 131 is positioned in the Y-axis direction. Further, when the shaft 131 is vertically inserted into the mounting surface 144, the shaft 131 is put into contact with the inner surface of the mounting hole 145 at the obverse surface and the reverse surface of the mounting surface 144 to be positioned also in the X-axis direction on the mounting surface 144.

[0068]

In this manner, in the present embodiment, the shaft 131 is surely mounted at a predetermined position in the horizontal direction. The shaft 131 is the rotational center of the drum 22 and hence the drum 22 is mounted in the horizontal plane with high accuracy.

[0069]

When the shaft 131 is inserted into the mounting hole 145, the angular direction of the drum 22 is adjusted such that the cut and bent portion 147 of the main base 12 is retained by the provisional mounting hole 135 of the drum 22. In this state, three mounting holes 146 formed on the mounting surface 144 of the tilt stand 142 face the respective screw holes 134 formed in the mounting portion 133 of the drum 22, which facilitates a screwing work. Moreover, since the cut and bent portion 147 is formed by cutting and bending the main base 12, it can be easily formed by press working.

[0070]

Subsequently, as shown in Fig. 9, the screws 150 are inserted into the respective mounting holes 146 and are screwed into the respective screw holes 134. Since the length of the side in the Y-axis direction of the mounting hole 146 is set at the diameter of the screw 150, when the screws 150 are screwed into the respective screw holes 134 through the mounting hole 146, the drum 22 is positioned in the angular direction. Here, the mounting hole 146 has a side larger than the diameter of the screw 150 in the X-axis direction and hence the screws 150 can easily be screwed.

[0071]

The drum 22 is angularly positioned by setting the

position of the drum 22 in the horizontal surface with high accuracy by the use of the shaft 131 and fixing the drum 22 with screws at positions relatively short distance away from the rotational center of the drum 22. Since screwing is made at the position relatively short distance away from the rotational center of the drum 22, even when the surface accuracy of the mounting surface 144 of the tilt stand 142 is relatively low, fixing the drum 22 with screw has extremely little effect on the linearity of the lead 132.

[0072]

Since the connector 136 for electrical connection can be exposed to the reverse surface side of the main base 12 between the drum 22 and the guide groove 2 by selecting the shape and size of the tilt stand 142, the area of the main base 12 can be effectively utilized to increase the flexibility of design.

[0073]

In the present embodiment as described above, the tilt stand and the respective mounting holes are formed by one normal-feed press process, which can reduce the number of processes. In order to form the main base by one normal-feed press process, the respective mounting holes are formed by vertical punching. Even in this case, by positioning the mounting hole by the obverse surface and the reverse surface of the tilting mounting surface, the positioning accuracy of

the mounting hole can be ensured also in the X-axis direction. Moreover, since the drum is positioned in the horizontal plane with respect of the center by the use of the shaft of the drum and is positioned in the angular direction by the use of the mounting holes near the shaft, the mounting accuracy of the drum is sufficiently high and even when the surface accuracy of the mounting surface is low, the linearity of the lead can be ensured. Further, since the drum is provisionally positioned by the simple cut and bent portion formed by cutting and bending the main base, the drum can be easily mounted. Still further, since the tilt stand can be reduced in size, the load of the press machine can be reduced and the tilt stand can be formed with high accuracy. Still further, since the opening of the main base can be reduced in size, the strength of the main base can be increased.

[0074]

[Advantages]

As described above, according to the present invention, by a tilt stand formed by one normal-feed press working, the number of processes may be reduced, and the load of the press machine may be reduced, and the strength of the chassis may be improved without decreasing mounting accuracy of the drum and without reducing accuracy of the linearity of the lead.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a plan view, when viewed from the top, of a magnetic recording reproducing apparatus in which the chassis, drum, and drum mounting unit of the magnetic recording reproducing apparatus are built-in in accordance with one embodiment of the present invention.

[Fig. 2]

Fig. 2 is an illustration showing a state in which a cassette holder is removed from Fig. 1.

[Fig. 3]

Fig. 3 is an illustration showing Fig. 1 when viewed from the different direction.

[Fig. 4]

Fig. 4 is a perspective view to specifically show the drum in Fig. 1 when viewed from a main base side.

[Fig. 5]

Fig. 5 is a perspective view showing the vicinity of the drum mounting portion of the main base 12 in Fig. 1.

[Fig. 6]

Fig. 6 is a perspective view, when viewed form the direction of C in Fig. 1, to show the drum mounting portion where the drum is mounted.

[Fig. 7]

Fig. 7 is an illustration showing how to make a

mounting hole in Fig. 5.

[Fig. 8]

Fig. 8 is an illustration to show the operation of the embodiment.

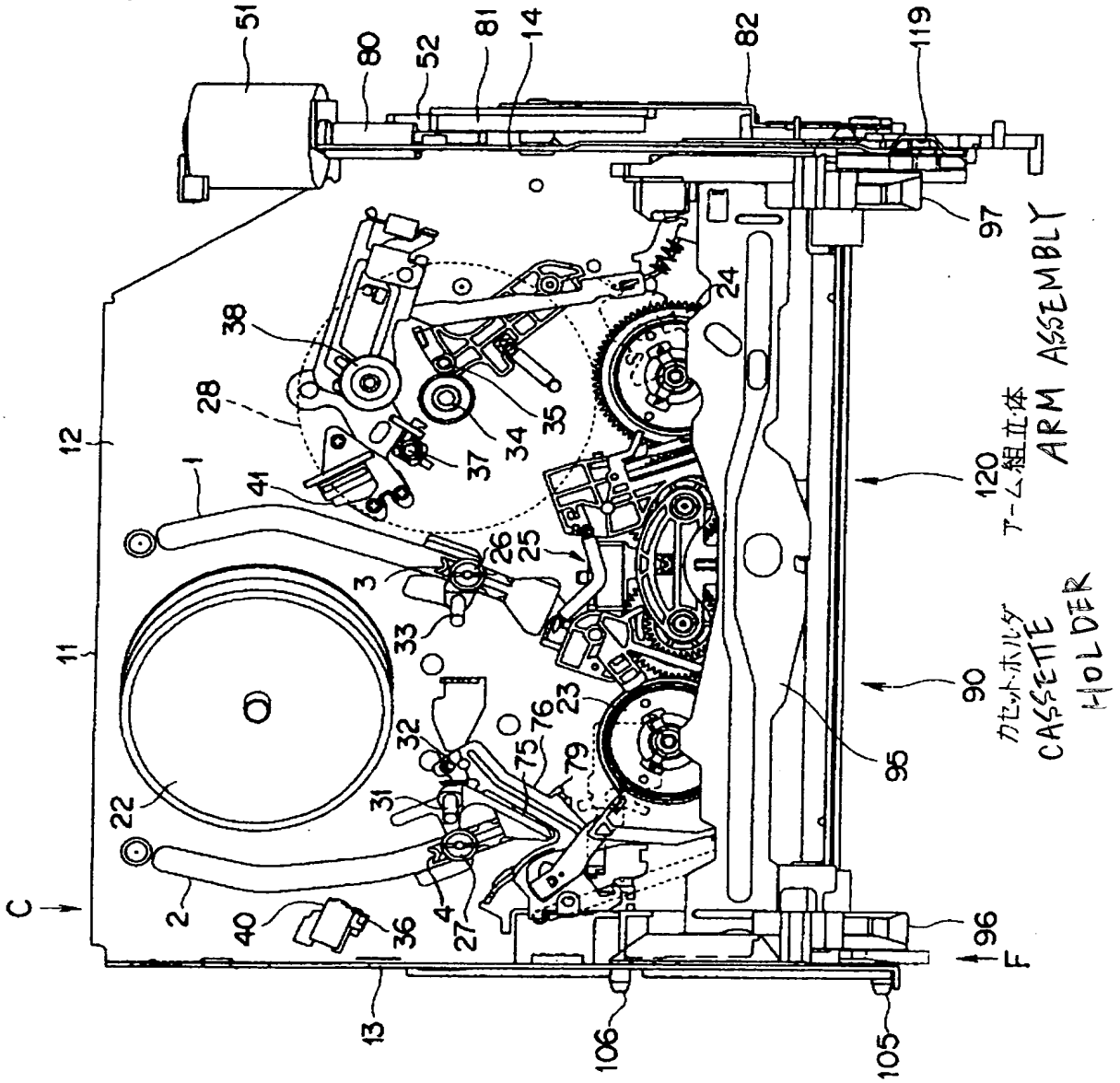
[Fig. 9]

Fig. 9 is an illustration to show the operation of the embodiment.

[Reference Numerals]

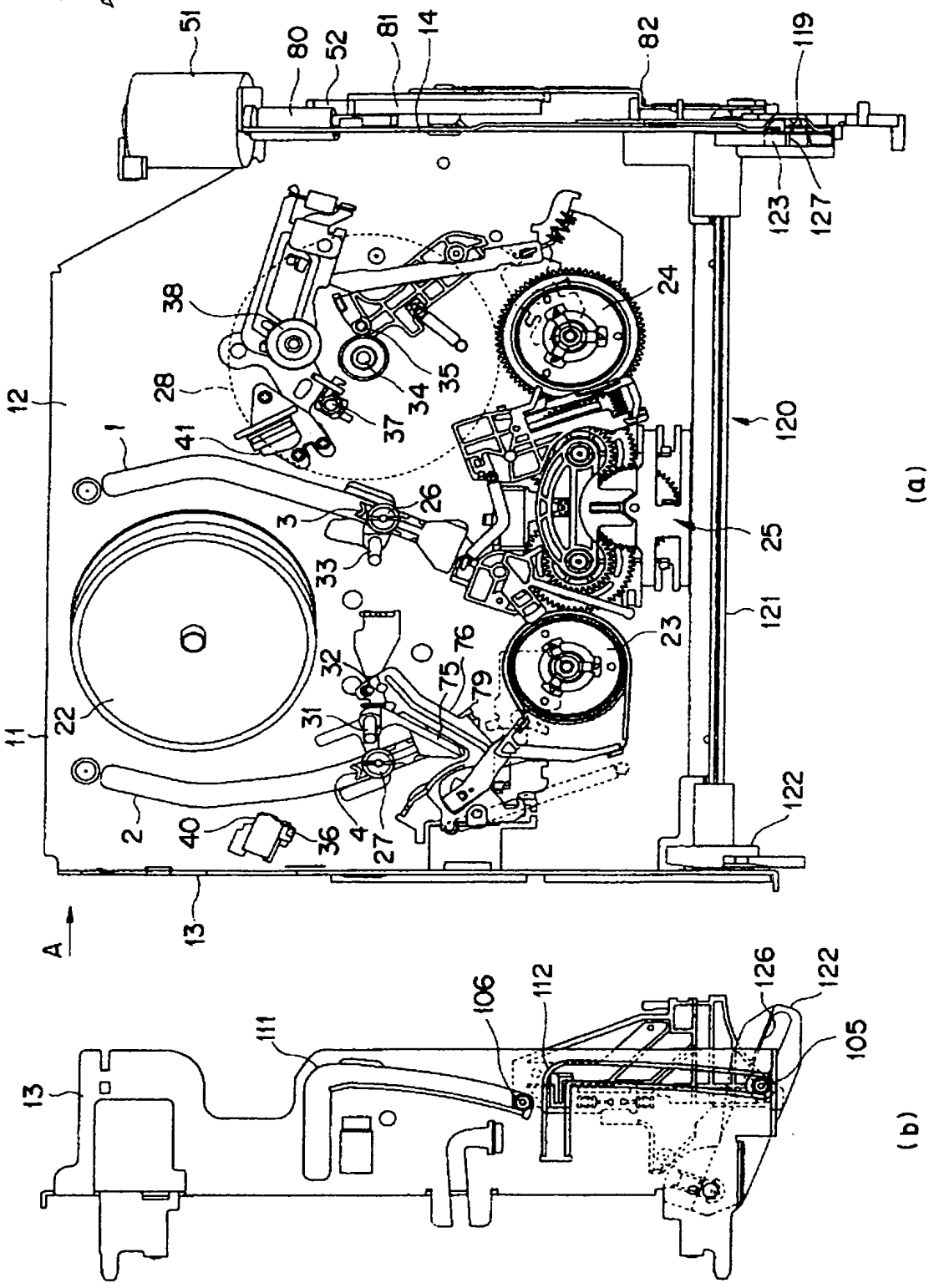
11...chassis, 12...main base, 22...drum, 131...shaft, 133...mounting portion, 134...screw hole, 135...provisional screw hole, 136...connector, 142...tilt stand, 143...opening, 144...mounting surface, 145...shaft mounting hole, 146...mounting hole, 147...cut and bent portion

【書類名】　図面
Name of Document : Drawings
【図１】
Figure. 1



【図２】

Figure. 2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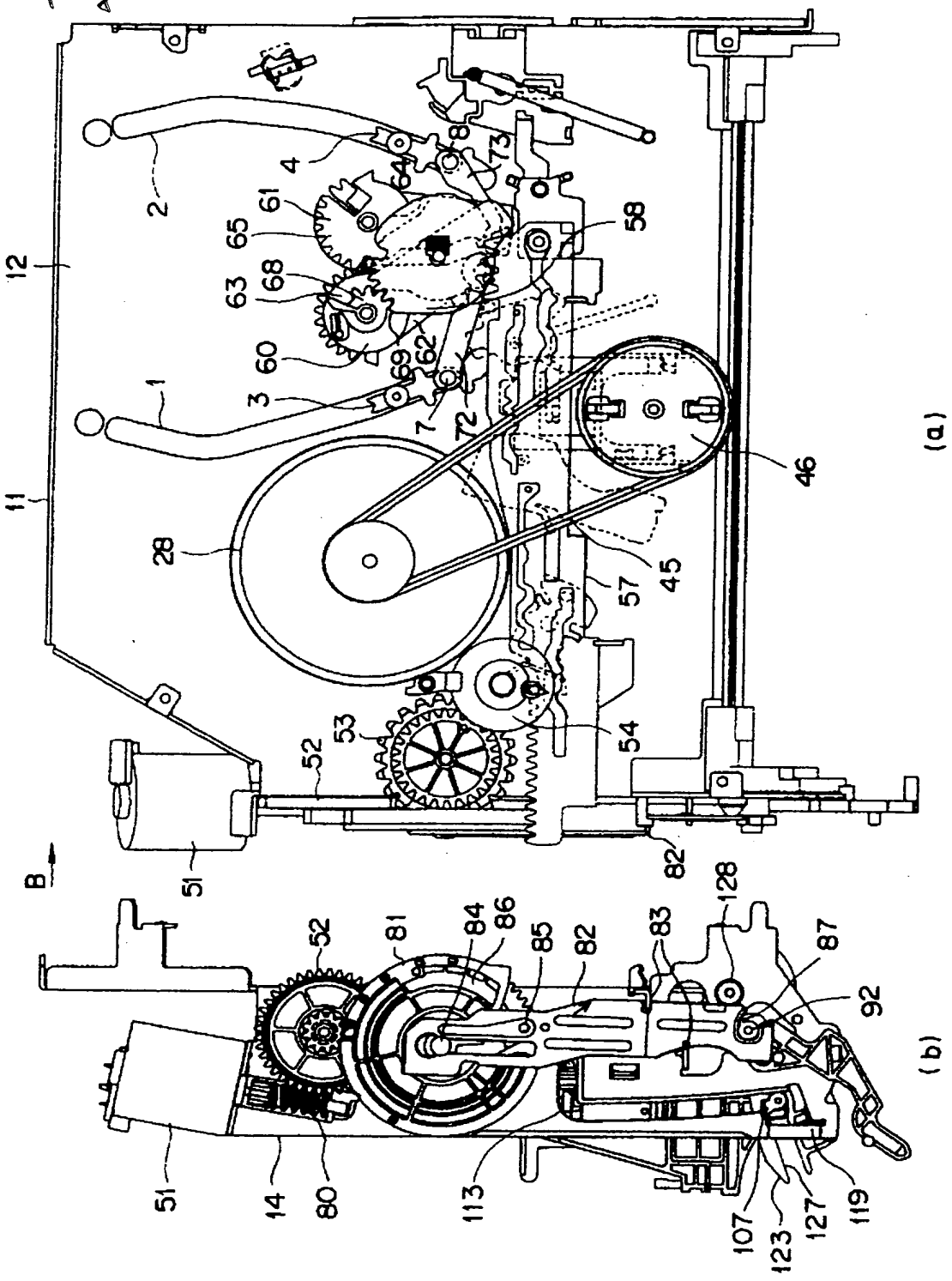
25
33
121
23
32
76
75
79
31
22
11
2
40
36
4
27
122
13
A
(a)
106
112
126
122
111
105
13
(b)

【図３】

Figure 3


(a)
(b)
B
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2
3
4
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11
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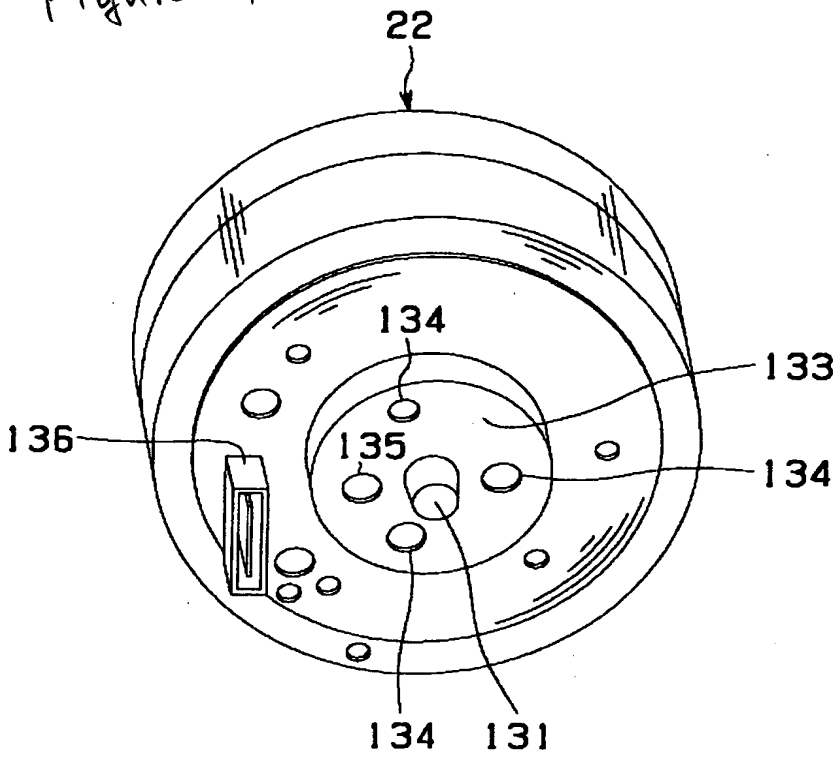
128

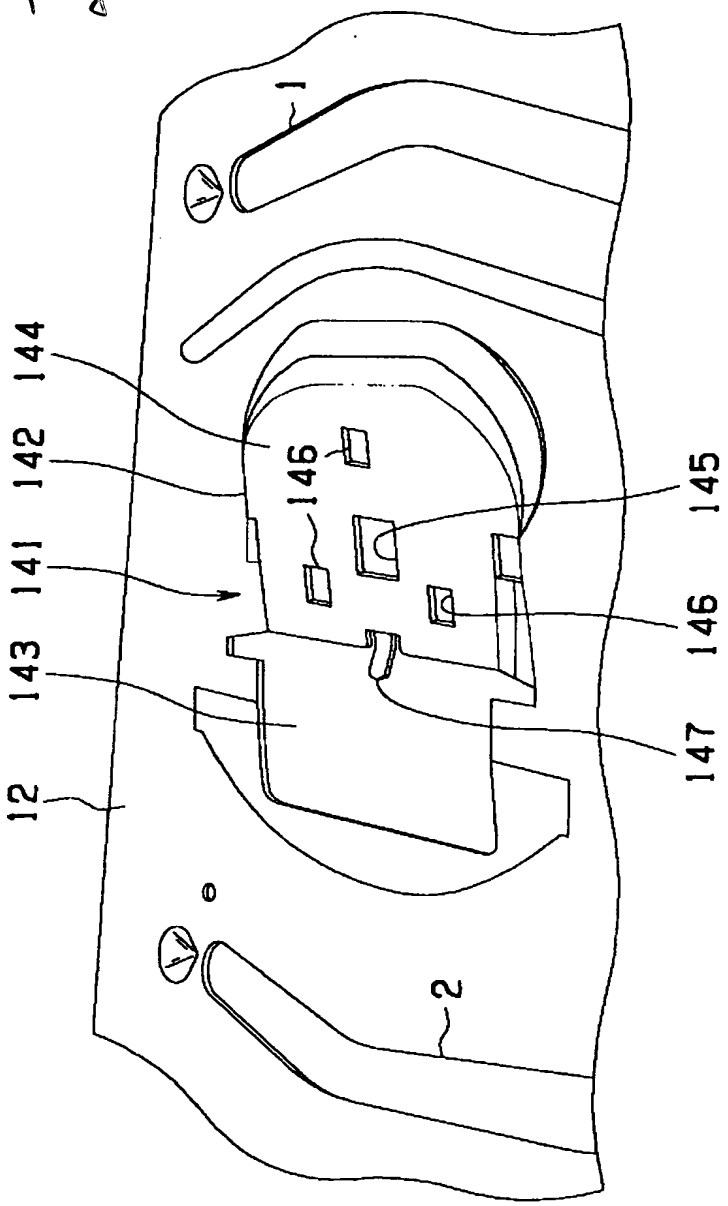
【図４】

Figure. 4

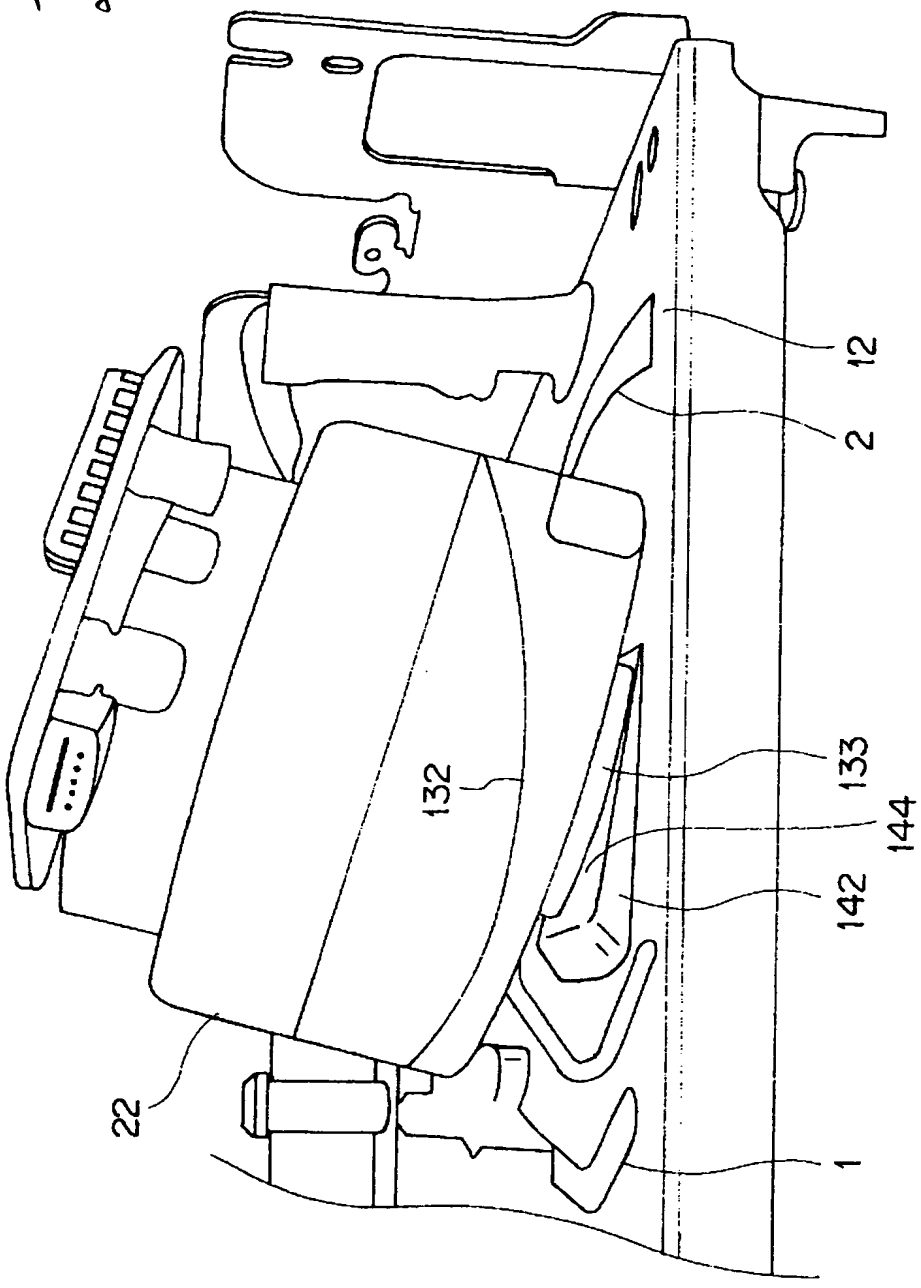


【図５】

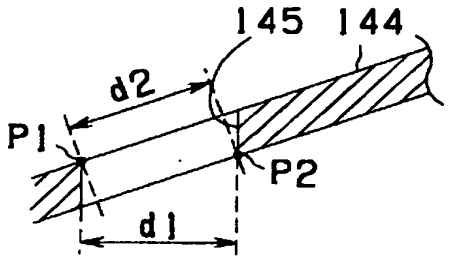
Figure 5



【図６】
Figure 6

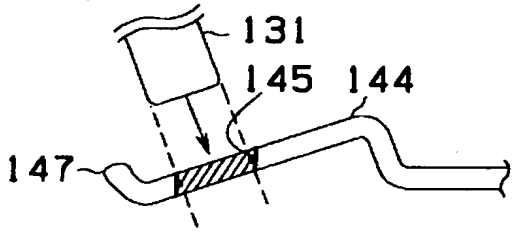


【図７】
Figure 7

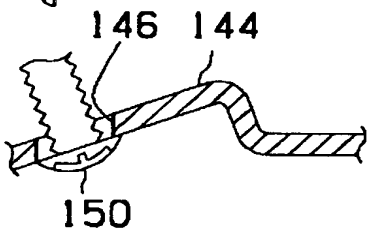


メインベース12の基準面
REFERENCE SURFACE OF MAIN BASE 12

【図８】
Figure 8



【図９】
Figure 9



[Name of Document] ABSTRACT

[Abstract]

[Object] To reduce the number of processes, reduce the load of a press machine, and improve the strength of a chassis without reducing the mounting accuracy of a drum and the linearity accuracy of a lead.

[Solving Means] A tilt stand 142 having a mounting surface 144 and mounting holes 145, 146 are formed by one normal-feed press working. The respective holes 145, 146 are rectangular holes formed by the vertical punching, each of which has one side equal to the diameter of a shaft and the diameter of a screw in the Y-axis direction. The mounting hole 145 into which the shaft is inserted has the other side in X-axis direction which is determined so as to come into contact with the shaft inserted into the hole in the direction perpendicular to the mounting surface 144 at the obverse surface and the reverse surface of the mounting surface 144. The drum has a structure in which the shaft projects from the bottom surface and is positioned with respect to the mounting surface by inserting the shaft into the mounting hole 145. Three screw holes are formed near the shaft of the drum. The mounting angle of the drum with respect to the mounting surface is determined by the use of the mounting holes 146 opposing to these screw holes respectively.

[Selected Figure] Fig. 5

[Fig. 1]

90 CASSETTE HOLDER

120 ARM ASSEMBLY

[Fig. 7]

REFERENCE SURFACE OF MAIN BASE 12